What's Beneath the Feathers?
CT Scan of a Live Adélie Penguin

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Non-invasive Computerized Tomography (CT) and three-dimensional reconstruction techniques, routinely used for medical diagnostics in humans, are powerful tools for anatomical investigation of live animals. In a pilot study of an Adélie penguin (see Figure 1), we reconstructed the skeleton and respiratory system from CT scans of a living bird (see Figure 2 and 3). These reconstructions will allow calculation of the volume of the air sacs and lungs in a living penguin. The size of the respiratory system and the ratio of air sac volume to lung volume are important parameters in determining the diving capacity of penguins. These parameters, which have never been measured in penguins, are critical to determining the magnitude of O_2 stores and to understanding the mechanisms of pressure tolerance (i.e., avoidance of barotrauma). We plan to extend these studies to other species of penguins.

Figure 1. **An Adélie penguin. What's beneath the feathers?**

Figure 2. **Dorsal view – 3D reconstruction of skeleton (yellow) and respiratory system (blue) of a live Adélie penguin. The respiratory system consists of the lungs and air sacs. Portions of legs, wing, and beak were outside scanner view.**

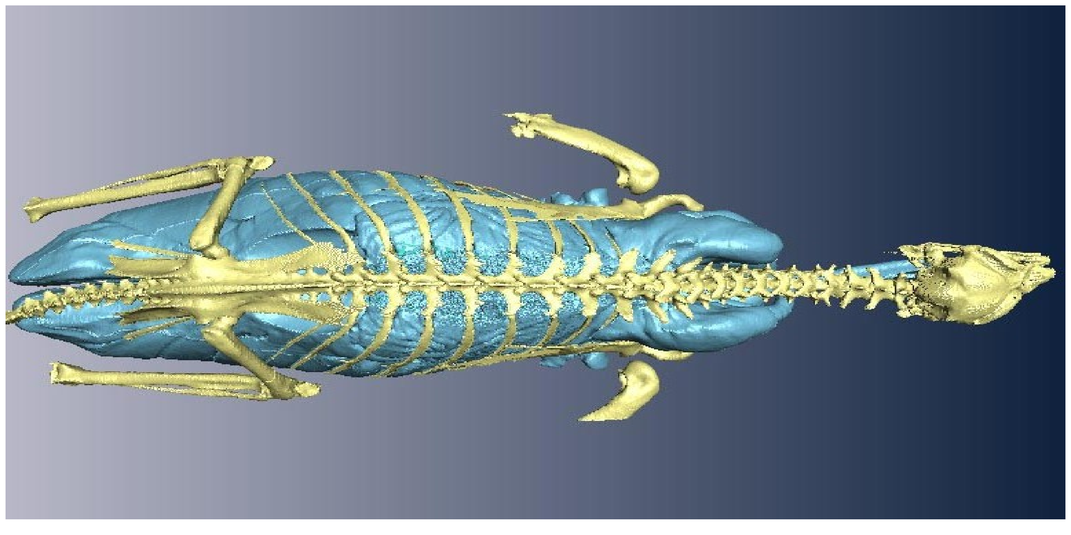

Figure 3. **Respiratory system with computerized subtraction of skeleton. Air sacs comprise most of the volume of the respiratory system. Air sacs are located in the abdomen, chest, and neck. Note rib indentations on lungs and air sacs.**